Solar Based Water Quality Monitoring system using IoT

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Abstract:

Now a days we are facing water problems due to due to the pollution of water in rivers and lakes. So, to overcome this problem and to see if the water is good for using or not, we have thought about a certain system which can measure the quality of water and check whether it's useful or not. To examine the safe supply of the water, the quality of water needs to be monitored in real time. In this paper we develop and design a system for real time monitoring for water monitoring using IOT (Internet of things). The proposed system consists of some sensors that are used to measure the parameters of the water. The parameters used in this system are conductivity, turbidity and pH value using solar panel. The measured values can be processed by using Arduino mega. Finally, the device information is shipped or delivered to web or cloud server using Wi-Fi module.

Key words: Arduino UNO, pH, Turbidity, conductivity.

Introduction:

At present time there are a lot of inventions, as well as pollution and global warming is being formed because of the water quality is not good or not safe for drinking. At present time the water monitoring is a challenge in real time because of limited water resource, global warming and increase in population. Maintaining good water quality in rivers would benefit both humans and animals and it is play's an important role in the life's of a human as well as animals. Any imbalance or change in quality of water or water pollution may lead to health diseases to humans and simultaneously cause ecological imbalance to the species. So, our major priority is to give importance to water quality.

Water pollution remains a major factor which is declining ecological health in aquatic ecosystems worldwide. In India, the largest river Ganga, poses significant threats to human health and the larger environment. Severely polluted with human waste and industrial contaminants, the river provides water to about 40% of India's population across 11 states, serving an estimated population of 500 million people which is more than any other river in the world. Today, the Ganges is the fifth-most polluted river in the world.

There are different methods to water quality management system. Different communication module is used like Bluetooth communication module and Wi-Fi module which helps to share the real time data which are read from the hardware system. In this project we used a step-down transformer for alternative source of energy

Existing Systems:

We have made this project by looking one of the systems which was already implemented by liebelium smart water device. The system monitors certain parameters like pH, electro conductivity, Oxidation/reduction potential and temperature. They have connected the device to cloud to monitor the obtained data in real time which provides a fast and effective values.

Alternate model will be around the Sensor-Based Water nature checking framework. The framework structural engineering comprises from claiming information following nodes, and base station What's more a remote station. Constantly on these stations would associate utilizing remote correspondence connection. Those information from hubs may be send of the build station Also information gathered Toward the build station for example, such that pH, turbidity, conductivity, and so forth. Is sent of the remote screening station. This process will be to acquire the water checking framework for helter skelter frequency, secondary mobility, and low powered. Disadvantage of the model is the price of the sensor is very high

Flow chart:
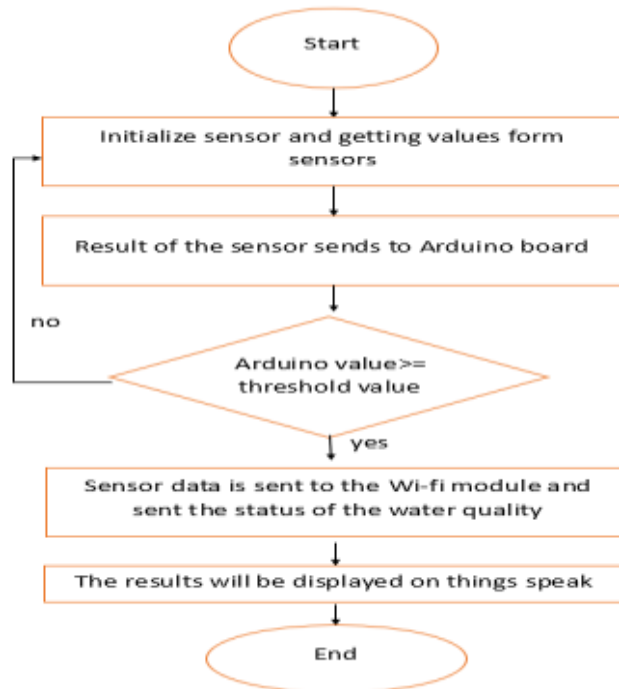
Methodology:

Our proposed system consists of three sensors they are pH sensor, Conductivity sensor and Turbidity sensor. The Arduino access the sensor data and send the data to the web using Wi-fi module
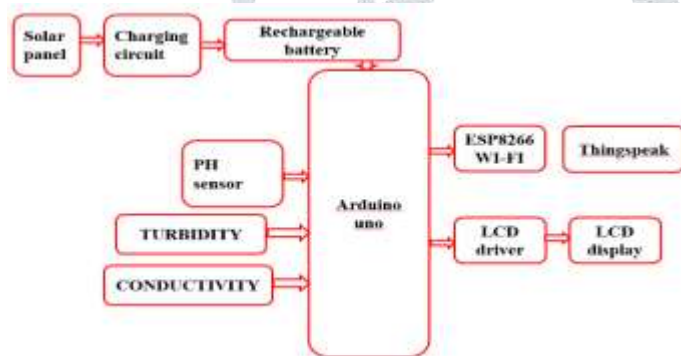
Block Diagram of proposed system

pH sensor: The pH sensor measures the pH value from the range of 0-14. less than 7 it indicates acidic solution and more than 7 it indicates alkaline or basic solution. Each type of pH sensor has different specifications to measure the quality of the water. The pH value of water can help determine the quality of water. Measuring the pH value can also provide indications of pipe corrosion, solids accumulation, and other harmful byproducts of an industrial process.

Turbidity sensor: It helps to calculate the amount of semi-solid particles present in water. Turbidity sensors are mainly used in wastewater and effluent measurements, river and stream gaging, sediment transport research, and laboratory measurements, control instrumentation for settling ponds. The value of turbidity sensor mostly measured in Formazin Nephelometric Unit (FNU), Formazin Turbidity Unit (FTU), Nephelometric Turbidity Unit (NTU).

Conductivity sensor: Conductivity sensor is used to measure how much electric current can pass through in the solution. Conductivity measurements are mostly used in industrial applications as a simple and inexpensive or less cost way to control the ionic content in a solution. The conductivity is monitored at different stages of the process in water purification systems


Systematic Diagram with its working

The proposed system consists of hardware and software. The hardware consists of sensors like pH, conductivity, turbidity which helps use to measure the quality of water in real time, along with Arduino Uno, LCD and Wi-Fi module ESP8266.

Each and every sensor are dipped in water sample and readings are analog and continuous. Since the values are in analog, we have to convert to digital and discrete by using Analog to digital converter (ADC) which is already present in ATmega 328P in Arduino Uno. The values will be display in 2*16 LCD display and through ESP8266 give microcontroller access to Wi-Fi i.e., this gives the connection between software and hardware and when Wi-Fi is turned on the information or the data is sent to cloud server.Software part is designed in Arduino IDE software
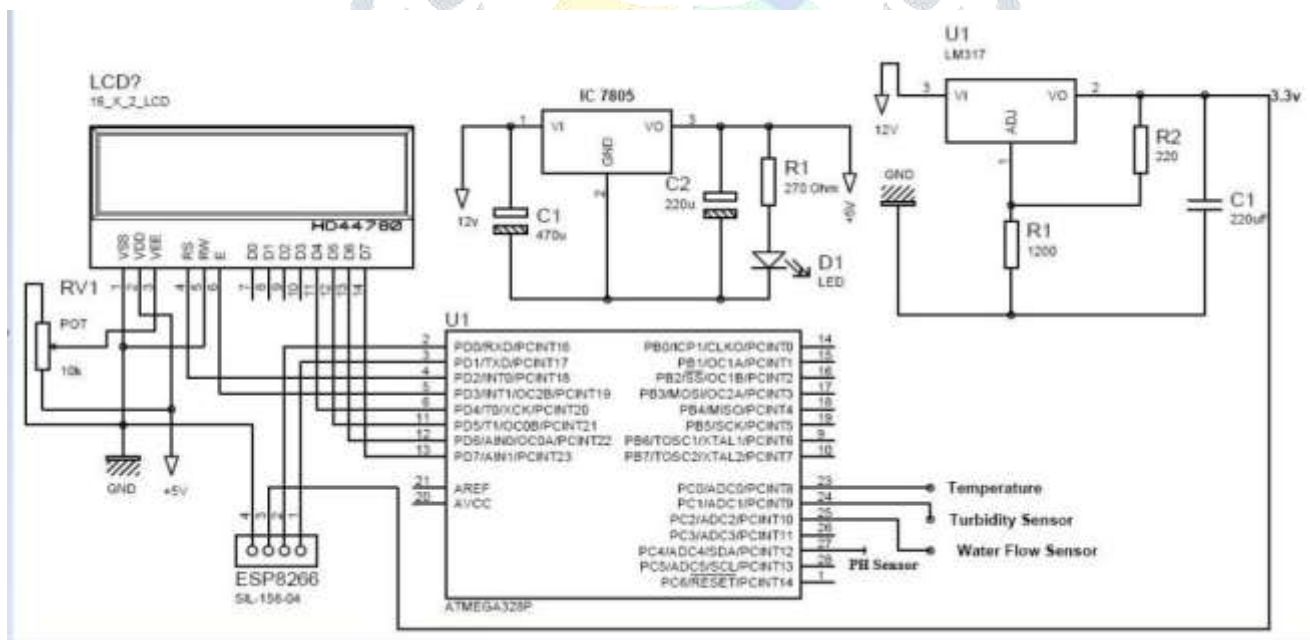
Circuit Diagram
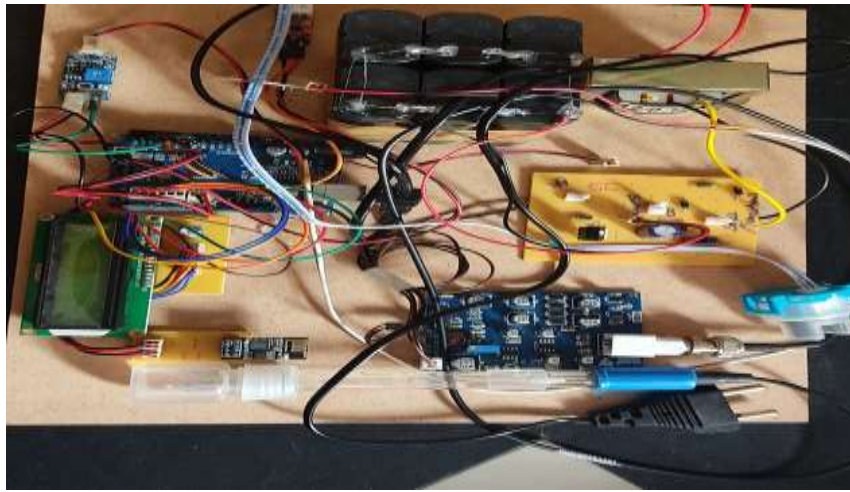
Hardware model

Result and discussion:

In this system we had taken three samples of water, 1) Mineral water.2) Muddy water

3) Tap water

In only sample 1 the water is safe for drinking and for the other samples

The parameters values are more than normal. So, they are not safe for drinking water.

In this figure the first one shows pH value and second one is conductivity and the last one is turbidity

Conclusion:

Based on the study of available water quality monitoring system, by the scenario of water we can say that proposed system is more suitable to check the water quality parameters in real time. This system introduces wireless sensor networking using several sensors to measure water quality, Wi-Fi module which make sensor network simple and more efficiently. Furthermore, to monitor data from all over the world IOT environment is provided using Arduino for creating gateway and also, cloud or web computing technology such as Thing speak is used to monitor data on the internet. Therefore, the system will be faster and more efficient in real time and user friendly. Thus, we can fulfill the aim and objective of the proposed system.

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